CLAIMS

1. A safety stock amount calculation method that calculates a safety stock amount SS based on a demand deviation σ for a certain commodity, an inventory adjustment period N calculated from a lead time L of the commodity or its components and a safety coefficient k that denotes the level of a ratio of service S for demand, the method characterized by comprising the steps of:

calculating a probability Pb that a delivery time for the commodity required by a customer is shorter than the lead time L;

calculating a representative value LL of the difference between the lead time L and the customer's required delivery time in the case where the lead time L has exceeded the customer's required delivery time;

correcting the inventory adjustment period N using the representative value LL; and

calculating the safety stock amount SS based on the standard deviation σ, corrected inventory adjustment period N, probability Pb and safety coefficient k.

2. The safety stock amount calculation method according to claim 1, characterized in that the step of calculating the safety stock amount SS calculates the safety stock amount SS using the following equation:

$$SS = Pb \times k \times \sqrt{N} \times \sigma$$

3. A safety stock amount calculation method that calculates

a safety stock amount SS based on a demand deviation σ for a certain commodity, an inventory adjustment period N calculated from a lead time L of the commodity or its components and a safety coefficient k that denotes the level of a ratio of service S for demand, the method characterized by comprising the steps of:

calculating the standard deviation σ based on demand data for the commodity to be obtained in the case where the lead time L has exceeded a customer's required delivery time;

calculating a representative value LL of the difference between the lead time L and the customer's required delivery time in the case where the lead time L has exceeded the customer's required delivery time;

correcting the inventory adjustment period N using the representative value LL; and

calculating the safety stock amount SS based on the standard deviation σ, corrected inventory adjustment period N, and safety coefficient k.

4. The safety stock amount calculation method according to any one of claims 1 to 3, characterized in that the step of correcting the inventory adjustment period N corrects the inventory adjustment period N using the representative value LL in place of the lead time L under a fixed order quantity system, and corrects the inventory adjustment period N using the value obtained by adding an ordering cycle M to the representative value LL in place of the lead time L under a periodic ordering system.

5. The safety stock amount calculation method according to any one of claims 1 to 4, characterized in that the corrected inventory adjustment period N is multiplied by a shipment frequency F.

6. The safety stock amount calculation method according to any one of claims 1 to 5, characterized in that the representative value LL is an average of the difference between the lead time L and customer's required delivery time.

7. The safety stock amount calculation method according to any one of claims 1 to 6, characterized in that the calculation method is applied to a system that performs inventory management based on a projected inventory which is the prediction value of a projected inventory amount.

8. A safety stock amount calculation device that calculates a safety stock amount SS based on a past demand deviation σ for a certain commodity, an inventory adjustment period N calculated from a lead time L of the commodity or its components and a safety coefficient k that denotes the level of a ratio of service S for demand, the device characterized by comprising:

a short delivery time ratio calculation section that calculates a probability Pb that a delivery time for the commodity required by a customer is shorter than the lead time L;

an average number of days exceeding delivery time calculation section that calculates a representative value LL

of the difference between the lead time L and the customer's required delivery time in the case where the lead time L has exceeded the customer's required delivery time;

an inventory adjustment period correction section that corrects the inventory adjustment period N using the representative value LL; and

a safety stock amount calculation section that calculates the safety stock amount SS based on the standard deviation σ, corrected inventory adjustment period N, short delivery time ratio Pb and safety coefficient k.

9. A safety stock amount calculation device that calculates a safety stock amount SS based on a past demand deviation σ for a certain commodity, an inventory adjustment period N calculated from a lead time L of the commodity or its components and a safety coefficient k that denotes the level of a ratio of service S for demand, the device characterized by comprising:

a demand standard deviation calculation section that calculates the standard deviation σ based on demand data for the commodity to be obtained in the case where the lead time L has exceeded a customer's required delivery time;

an average number of days exceeding delivery time calculation section that calculates a representative value LL of the difference between the lead time L and the customer's required delivery time in the case where the lead time L has exceeded the customer's required delivery time;

an inventory adjustment period correction section that corrects the inventory adjustment period N using the

representative value LL; and

a safety stock amount calculation section that calculates the safety stock amount SS based on the standard deviation σ, corrected inventory adjustment period N, and safety coefficient k.

10. The safety stock amount calculation device according to claim 8 or 9, further comprising means for inputting the lead time L and ratio of service S and means for displaying the safety stock amount SS.

11. The safety stock amount calculation device according to any one of claims 8 to 10, further comprising a reorder point calculation section that calculates a reorder point O by adding a value obtained by multiplying a demand average A and the representative value LL to the safety stock amount SS.

12. The safety stock amount calculation device according to any one of claims 8 to 10, further comprising an order quantity calculation section that adds an amount of the commodity or its components to be used in the period obtained by adding the representative value LL and an ordering cycle M to the safety stock amount SS and subtracts, from the obtained value, a current stock amount and current order remaining amount to calculate an order quantity O'.

13. A safety stock amount calculation program that allows, in order to calculate a safety stock amount SS, a computer to function as:

means for calculating a commodity demand deviation σ related to demand for a certain commodity;

means for calculating a probability Pb that a delivery time for the commodity required by a customer is shorter than the lead time L of the commodity or its components;

means for calculating a representative value LL of the difference between the lead time L and the customer's required delivery time in the case where the lead time L has exceeded the customer's required delivery time;

means for calculating an inventory adjustment period N using the representative value LL; and

means for calculating the safety stock amount SS based on the standard deviation σ, corrected inventory adjustment period N, probability Pb and a safety coefficient k that denotes the level of a ratio of service S for demand.

14. A safety stock amount calculation program that allows, in order to calculate a safety stock amount SS, a computer to function as:

means for calculating a commodity demand deviation σ related to demand for a certain commodity based on data to be obtained in the case where the lead time L of the commodity or its components has exceeded the customer's required delivery time;

means for calculating a representative value LL of the difference between the lead time L and the customer's required delivery time in the case where the lead time L has exceeded a customer's required delivery time;

means for calculating an inventory adjustment period N

using the representative value LL; and

means for calculating the safety stock amount SS based on the standard deviation σ, corrected inventory adjustment period N, and a safety coefficient k that denotes the level of a ratio of service S for demand.

15. A reorder point calculation method characterized by comprising calculating a reorder point O by adding a value obtained by multiplying a demand average A and the representative value LL to a safety stock amount SS calculated by the safety stock amount calculation method as described in any one of claims 1 to 6.

16. A order quantity calculation method characterized by comprising adding an amount of the commodity or its components to be used in the period obtained by adding the representative value LL and an ordering cycle M to the safety stock amount SS calculated by the safety stock amount calculation method as described in any one of claims 1 to 6 and subtracting, from the obtained value, a current stock amount and current order remaining amount to calculate an order quantity O'.

17. A safety stock amount calculation method characterized by comprising the steps of:

calculating an appearance probability of a certain delivery time for each delivery time based on the delivery time for a certain commodity required by a customer and its frequency;

calculating an appearance probability of a lead time of

the commodity or its components;

calculating, based on the customer's required delivery time and lead time, an effective lead time T_i that denotes the period between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the time when the commodity has become available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder point;

calculating an appearance probability of the effective lead time T_i for each effective lead time T_i based on the appearance probability of the customer's required delivery time and the appearance probability of the lead time; and

calculating a safety stock amount ss based on a demand standard deviation σ_D for the commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the appearance probability of the effective lead time.

18. A safety stock amount calculation method characterized by comprising the steps of:

calculating an appearance probability of a certain delivery time for each delivery time based on the delivery time for a certain commodity required by a customer and its frequency to create a probability distribution g_j of the customer's required delivery time;

calculating an appearance probability of a lead time of the commodity or its components to create a probability distribution h_k of the lead time;

calculating, based on the customer's required delivery time and lead time, an effective lead time T_i that denotes the period between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the time when the commodity has become available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder point;

calculating an appearance probability of the effective lead time T_i for each effective lead time T_i based on the probability distribution g_j of the customer's required delivery time and the probability distribution h_k of the lead time to create a probability distribution f_i of the effective lead time; and

calculating a safety stock amount ss based on a demand standard deviation σ_D for a certain commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the probability distribution f_i of the effective lead time.

19. The safety stock amount calculation method according to claim 18, characterized in that the step of calculating the safety stock amount ss calculates the safety stock amount ss using the following equation:

$$ss = k\sqrt{\sum f_i^2 T_i}\sigma_D$$

20. The safety stock amount calculation method according to claim 18 or claim 19, characterized in that the step of calculating the safety stock amount ss further uses a demand

frequency F_D that denotes an appearance probability of the period during which demand per unit of period is not 0.

21. The safety stock amount calculation method according to any one of claims 18 to 20, characterized in that at least one of the probability distribution of g_j of the customer's required delivery time and the probability distribution h_k of the lead time is a discrete probability distribution.

22. A safety stock amount calculation device characterized by comprising:

a delivery time appearance probability calculation section that calculates an appearance probability of a certain delivery time for each delivery time based on the delivery time for a certain commodity required by a customer and its frequency;

a lead time appearance probability calculation section that calculates an appearance probability of a lead time of the commodity or its components;

an effective lead time calculation section that calculates, based on the customer's required delivery time and lead time, an effective lead time T_i that denotes the period between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the time when the commodity has become available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder point;

an effective lead time appearance probability calculation

section that calculates an appearance probability of the effective lead time T_i for each lead time T_i based on the appearance probability of the customer's required delivery time and the appearance probability of the lead time; and

a safety stock amount calculation section that calculates a safety stock amount ss based on a demand standard deviation σ_D for a certain commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the appearance probability of the effective lead time.

23. A safety stock amount calculation device characterized by comprising:

a probability distribution of customer's required delivery time calculation section that calculates an appearance probability of a certain delivery time for each delivery time based on the delivery time for a certain commodity required by a customer and its frequency to create a probability distribution g_j of the customer's required delivery time;

a lead time probability distribution calculation section that calculates an appearance probability of a lead time of the commodity or its components to create a probability distribution h_k of the lead time;

an effective lead time calculation section that calculates, based on the customer's required delivery time and lead time, an effective lead time T_i that denotes the period between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the

time when the commodity has become available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder point;

an effective lead time probability distribution calculation section that calculates an appearance probability of the effective lead time T_i for each lead time Ti based on the probability distribution g_j of the customer's required delivery time and the probability distribution h_k of the lead time to create a probability distribution f_i of the effective lead time; and

a safety stock amount calculation section that calculates a safety stock amount ss based on a demand standard deviation σ_D for a certain commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the probability distribution f_i of the effective lead time.

24. A safety stock amount calculation program that allows, in order to calculate a safety stock amount ss of a certain commodity, a computer to function as:

means for calculating, based on a customer's required delivery time and a lead time of the commodity or its components, an effective lead time T_i that denotes the period between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the time when the commodity has become available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder

point;

means for calculating an appearance probability of the effective lead time T_i for each lead time T_i based on an appearance probability of the customer's required delivery time calculated from the customer's required delivery time and its frequency and an appearance probability of the lead time of the commodity or its components; and

means for calculating a safety stock amount ss based on a demand standard deviation σ_D for the commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the appearance probability of the effective lead time.

25. A safety stock amount calculation program that allows, in order to calculate a safety stock amount ss of a certain commodity, a computer to function as:

means for calculating an appearance probability of a certain delivery time for each delivery time based on the delivery time for a certain commodity required by a customer and its frequency to create a probability distribution g_j of the customer's required delivery time;

means for calculating an appearance probability of a lead time of the commodity or its components to create a probability distribution h_k of the lead time;

means for calculating, based on the customer's required delivery time and lead time, an effective lead time T_i that denotes the period between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the time when the commodity has become

available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder point;

means for calculating an appearance probability of the effective lead time T_i for each lead time T_i based on the probability distribution g_j of the customer's required delivery time and the probability distribution h_k of the lead time to create a probability distribution f_i of the effective lead time; and

means for calculating a safety stock amount ss based on a demand standard deviation σ_D for the commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the probability distribution f_i of the effective lead time.

26. A reorder point calculation method characterized by comprising calculating a reorder point Q_{RO} based on a safety stock amount ss calculated by the safety stock amount calculation method as described in any one of claims 17 to 21, a representative value DA of a demand per unit of period, and a marginal lead time L_M that denotes a minimum value of the effective lead time to be obtained after the cumulative value of the appearance probability of the effective lead time T_i has exceeded the ratio of service S.

27. The reorder point calculation method according to claim 26, characterized by comprising calculating the reorder point Q_{RO} by further using a demand frequency F_D that denotes an appearance probability of the period during which demand per

unit of period is not 0 in addition to the safety stock amount ss, representative value DA of a demand, and marginal lead time L_M.

28. A reorder point calculation device characterized by comprising:

a delivery time appearance probability calculation section that calculates an appearance probability of a certain delivery time for each delivery time based on the delivery time for a certain commodity required by a customer and its frequency;

a lead time appearance probability calculation section that calculates an appearance probability of a lead time of the commodity or its components;

an effective lead time calculation section that calculates, based on the customer's required delivery time and lead time, an effective lead time T_i that denotes the period between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the time when the commodity has become available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder point;

an effective lead time appearance probability calculation section that calculates an appearance probability of the effective lead time T_i for each lead time T_i based on the appearance probability of the customer's required delivery time and the appearance probability of the lead time;

a safety stock amount calculation section that calculates

a safety stock amount ss based on a demand standard deviation σ_D for the commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the appearance probability of the effective lead time; and

a reorder point calculation section that calculates a reorder point Q_{RO} based on the safety stock amount ss, a representative value DA of a demand per unit of period, and a marginal lead time L_M that denotes a minimum value of the effective lead time to be obtained after the cumulative value of the appearance probability of the effective lead time T_i has exceeded the ratio of service S.

29. A reorder point calculation device characterized by comprising:

a probability distribution of customer's required delivery time calculation section that calculates an appearance probability of a certain delivery time for each delivery time based on the delivery time for a certain commodity required by a customer and its frequency to create a probability distribution g_j of the customer's required delivery time;

a lead time probability distribution calculation section that calculates an appearance probability of a lead time of the commodity or its components to create a probability distribution h_k of the lead time;

an effective lead time calculation section that calculates, based on the customer's required delivery time and lead time, an effective lead time T_i that denotes the period

between the time when it has been predicted that the commodity stock will fall below a corresponding reorder point and the time when the commodity has become available after the commodity had been ordered based on the prediction that the commodity stock would fall below a corresponding reorder point;

an effective lead time probability distribution calculation section that calculates an appearance probability of the effective lead time T_i for each lead time Ti based on the probability distribution g_j of the customer's required delivery time and the probability distribution h_k of the lead time to create a probability distribution f_i of the effective lead time;

a safety stock amount calculation section that calculates a safety stock amount ss based on a demand standard deviation σ_D for a certain commodity per unit of period, a safety coefficient k that denotes the level of a ratio of service S for demand, the effective lead time T_i and the probability distribution f_i of the effective lead time; and

a reorder point calculation section that calculates a reorder point Q_{RO} based on the safety stock amount ss, a representative value DA of a demand per unit of period, and a marginal lead time L_M that denotes a minimum value of the effective lead time to be obtained after the cumulative value of the appearance probability of the effective lead time T_i has exceeded the ratio of service S.

30. The reorder point calculation device according to claim 28 or 29, characterized in that the reorder point calculation

section calculates the reorder point Q_{RO} by further using a demand frequency F_D that denotes an appearance probability of the period during which demand per unit of period is not 0 in addition to the safety stock amount ss, representative value DA of a demand, and marginal lead time L_M.